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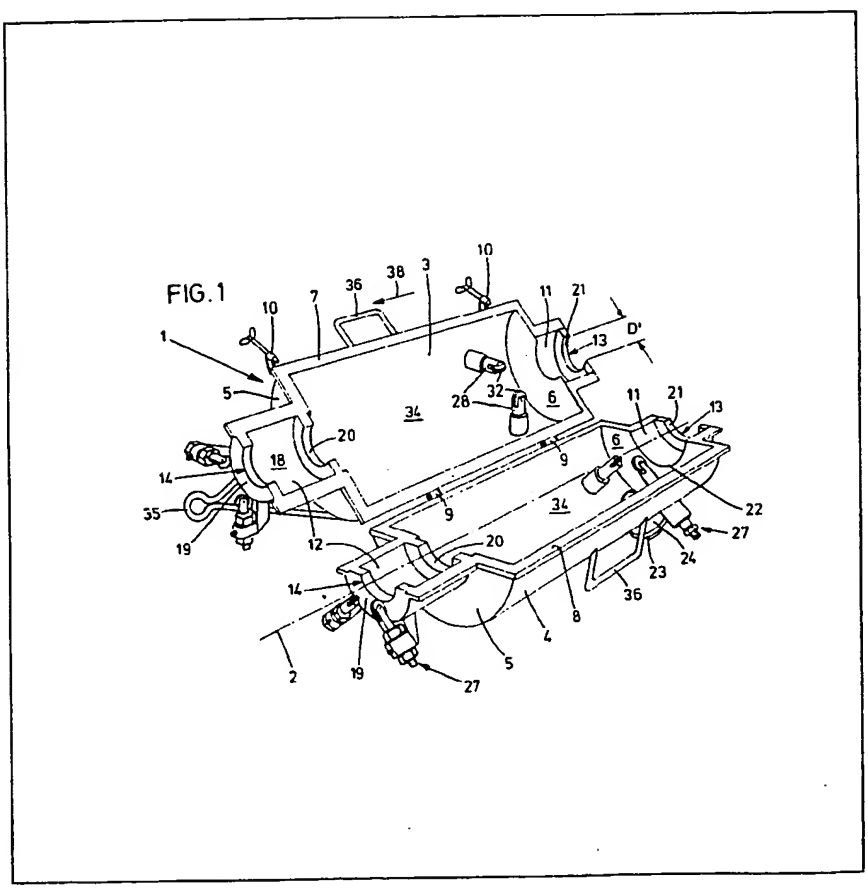
(54) **Coating cables**

(57) Freely tensioned support cables 15 are coated with bitumen, plastics material or paint using apparatus comprising container 1 formed of two halves 3, 4 hinged together by hinges 9. The container 1 has two aligned orifices 13, 14, through which the cable passes. The outlet orifice 13 has an exchangeable die 21 to determine coating thickness. The inlet orifice 14 is contained in a spigot 12 extending from the container 1 and includes ring seals 16 (Figure 3).

Axially spaced sets of guiding and bracing devices 27, one set outside the container adjacent orifice 14 and one inside the container 1 adjacent the orifice 13, serve to locate the cable 15 accurately concentrically with the orifices 13, 14.



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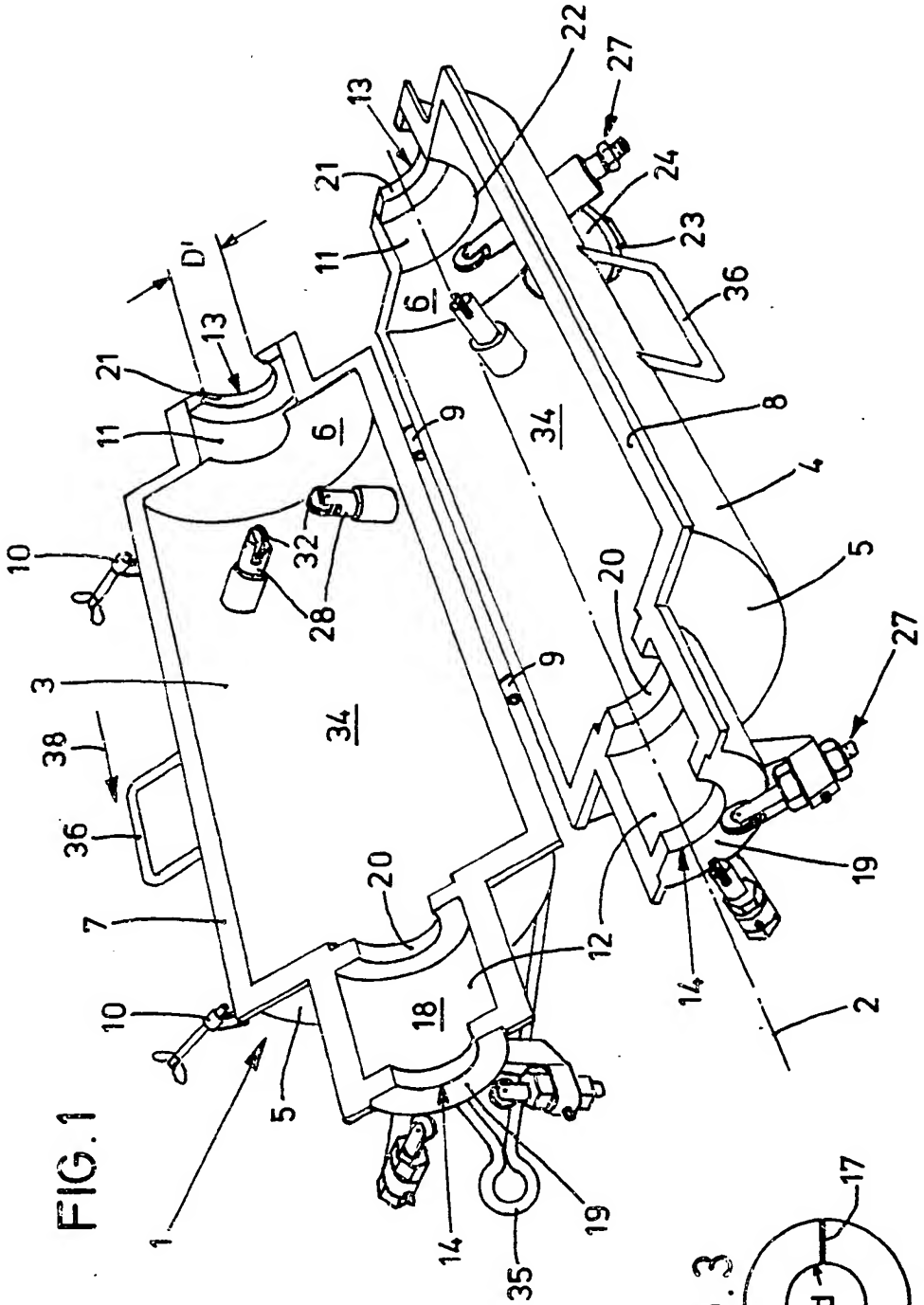

FIG. 1

FIG. 3

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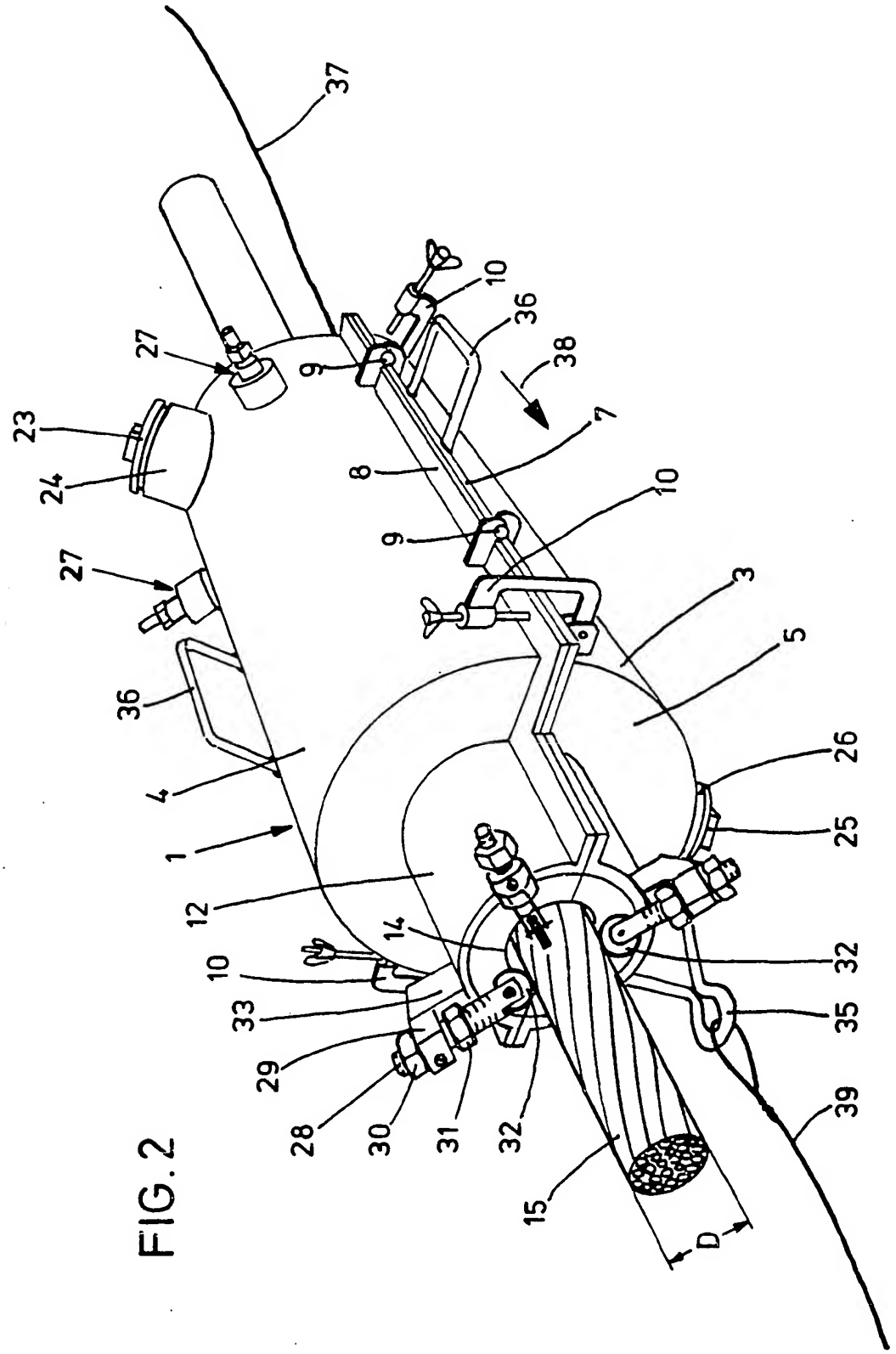

FIG. 2

SPECIFICATION

Apparatus for coating elongate objects with deformable coating materials

The invention relates to an apparatus for coating an elongate object with deformable coating materials, particularly but not exclusively, for coating freely tensioned support cables with bitumen, plastics material or paint.

In the coating or painting of freely tensioned support cables, e.g., of diagonal cable bridges, for decades hitherto an anti-corrosion coating has been applied by letting down on said support cables so-called cable trucks occupied by one or two workers who applied the coating material, particularly paint, manually to the support cable. Naturally, when said coating materials were applied manually, it was only possible to use low-viscosity materials which could be applied by brush only in a small layer thickness. The application of a second layer or coat was practically excluded because if the cable truck travelled over a coating already applied it considerably damaged the latter due to the high pressure forces.

The present invention seeks to develop an apparatus for coating elongate objects with deformable materials, and particularly for coating freely tensioned support cables with, for example, bitumen, plastics materials, or paints.

According to the invention there is provided apparatus for coating an elongate object with deformable coating material, including a container constructed to accmmodate the coating material and having two mutually aligned orifices through which said elongate object is able to pass, of which a first orifice has a slight oversize compared to the object to be coated, and wherein at least one seal element adapted to be pressed against the object is associated with the second orifice.

By these measures, an apparatus which accommodates the object to be coated in itself and is then guided along the same is created for the first time. At the same time one orifice, in use the upper orifice, is sealed whereas the other orifice, in use the lower orifice, forms a precisely defined gap with reference to the object to be coated, i.e., generally the support cable and also serves as a stripper screen and as a retension point to intensify the coating process. Cables other than support cables of diagonal cable bridges, e.g., the support cables of cable network cooling towers can also be coated.

The container may be adapted to be hinged open in an axial plane so that the apparatus can enclose the object to be coated in a simple manner. This is important particularly when - as in the case of the support cables mentioned - the objects to be coated have no free end which can be treated into and through the container.

Preferably, the first orifice is constructed as an exchangeable screen so that - within limits - objects of different diameters and variable cross-sections on the one hand can be provided with coatings of different layer thickness on the other hand, without any other adaptation of the apparatus being necessary for this purpose.

Preferably, a plurality of axially spaced bracing and guiding devices are provided which serve to ensure precise centering of the apparatus relatively to the object to be coated. The bracing and guiding devices are preferably adapted to be radially adjustable. The devices may be provided with bracing and guiding elements, which may be rollers, at their radially inner ends. Preferably, at least two axially spaced sets of bracing and guiding devices are provided, each set comprising at least three bracing and guiding devices arranged in a common plane in each case. One set of the devices may be arranged in the container in the proximity of the first orifice, and another set may be arranged outside the container in the proximity of the second orifice.

Certain of the bracing and guiding devices may be adapted to be radially elastically yielding so that, even in the event of diameters of cross-sectional shapes fluctuating along the length of the object to be coated, a satisfactory centering between the object to be coated and the apparatus is ensured on the one hand, without the danger of wedging or jamming arising on the other hand.

In a preferred embodiment, the container is of cylindrical construction and the orifices are aligned with the median axis thereof. The second orifice may be constructed in a cylindrical projecting spigot accommodating the at least one seal element. The container may also have a filling orifice in the proximity of the first orifice and a discharge orifice in the proximity of the second orifice.

A preferred embodiment of the invention will now be described by way of example with reference to the accompanying drawing, wherein:

Figure 1 shows a perspective view of an apparatus according to the invention in a hinged-open state,

Figure 2 shows the apparatus according to Figure 1 in the closed state rotated through 180° about its median axis and

Figure 3 shows in plan a ring seal used in the apparatus according to Figures 1 and 2.

The apparatus illustrated in the drawing has a cylindrical container 1 which is divided in a plane of its longitudinal axis 2, and which is therefore constituted by two semi-cylindrical container halves 3,4. It is largely closed at its ends by means of annular disc-shaped end walls 5, 6, which are of course likewise divided. The two container halves 3, 4 have encircling radially projecting flanges 7, 8 which are in mutual contact in the closed state of the two container halves 3, 4, as is clear from Figure 2.

Hinges 9 are attached to the flanges on one longitudinal side for the opening and closing of the container 1. So-called screw-lever fasteners 10 are also attached to the flanges 7 and 8 at the two longitudinal sides of the container, by means of which the two container halves 3, 4 can be joined together very rapidly, whilst said joint is easy to release again.

Projecting spigots 11, 12, which are likewise divided in the said joint plane, are attached to the end walls 5, 6 coaxially with the median axis 2. Said projecting spigots 11, 12 respectively bound a first orifice 13 and a second orifice 14. The second orifice

14 has a diameter which is slightly greater than the diameter of an object 15 to be coated, e.g., of a cable. In the associated projecting spigot 12 ring seals, 16 - illustrated in Figure 3 - are arranged, the internal diameter d of which is smaller than the diameter D of the object 15; so that the rings can totally develop the object, they have at least one radial slit 17, so that they can be applied round the object 15 with corresponding deformation. Said rings seals 16 collectively constitute a stuffing box gland which packs the seal chamber 18 which is constituted in the projecting spigot 12 between the associated end wall 5 and the external closure ring 19 accommodating the second orifice 14. Said ring seals 16 consist of felt or of another suitable seal material. The passage 20 in the end wall 5 associated with the seal chamber 18 has a diameter equal to or greater than the second orifice 14.

The projecting spigot 11 present at the other end of the container 1 is closed by an annular exchangeable screen 21 which limits the first orifice 13. Said first orifice 13 has a diameter D' which is greater than the diameter D of the object to be coated by a dimension which corresponds exactly to twice the desired coating thickness. Therefore if a cable of 80 mm diameter is required to be provided with a coating 2 mm thick, then the required diameter of the first orifice 13 is D' = 84 mm.

As may be seen from Figure 3, here again there is associated in alignment with the first orifice 13 a passage 22 in the associated end wall 6, the diameter of which is equal to or greater than D'. In one container half 4 there is provided at the end associated with the first orifice 13 having the screen 21, an inlet pipe connection 24 closable by means of a cover 23 and constituting an inlet orifice, whilst there is likewise provided on one container half 3 at the other end of the container a discharge pipe connection 26 again closeable by a cover 25 and constituting a discharge orifice.

There are attached to the container 1 a series of bracing and guiding devices 27, which are subsstantially constituted by a bolt 28 arranged radially to the median axis 2 and partially provided with a screw-thread, which is maintained in each case in a fixed mounted guide ring 29 and is adjustable radially relatively to the latter by means of two screw nuts 30, 31. At their inner end the bolts 28 each carry a roller 32 serving as a bracing and guiding element.

Four such bracing and guiding devices 27 are fitted in a plane oriented at right angles to the median axis 2 on the outer end of the projecting spigot 12, so that the rollers 32 are located directly in front of the associated second orifice. For this purpose the guide rings 29 are attached to the outside of the projecting spigot 12 by means of stay plates 33.

A second set of bracing and guiding devices 27, which likewise comprises four bracing and guiding devices 27 arranged at equal angular intervals in a plane at right angles to the median axis 2, is attached to the container 1. The bolts 28 with the rollers 32 project into the interior 34 of the containers, as may be seen particularly from Figure 1. Said bracing and guiding devices are arranged in proximity of the end wall 6 associated with the first orifice 13.

A cable eye 35 is attached at each end to one container half 3, namely to that to which the discharge pipe connection 26 is fitted. Handles 36 for opening and closing the container 1 and for its manual transport are also provided on the container halves 3, 4.

The coating of an object 15, e.g., a support cable of a diagonal cable bridge, with an anti-corrosion agent, such as bitumen, plastics materials or paint, proceeds in the following manner: the container 1 is applied to the cable by one container half 3 on the ground, after a sufficient number of rings seals 16 have previously been placed round the cable so that they pack the one half of the seal chamber 18. The other container half 4 is then hinged closed. The firm joining of the two container halves 3, 4 is effected by means of the screw-lever fasteners 10. The arrangement of the container 1 is such that the projecting spigot 12 accommodating the ring seals 16 is underneath, whereas the projecting spigot 11 carrying the first orifice 13 - i.e., the screen 21 - is uppermost. The bracing and guiding devices are adjusted radially so that the object 15 to be coated, i.e., the support cable, is centred accurately to the median axis 2 of the container, so that particularly the first orifice 13 leaves a gap of equal width with reference to the cable about its entire circumference.

Then the entire apparatus is hauled up on the support cable by means of a traction cable 37 which is hooked to the upper cable eye (not shown in the drawing). In this top initial position the coating material is filled into the interior 34 of the container 1 through the inlet pipe connection 24. The apparatus is then let down again. During this the article to be coated 15, i.e. the support cable is drawn through the generally highly viscous coating material present in the interior space 34, which adheres to the surface of the object 15 with a considerable excess. As may be seen in the drawing, the bracing and guiding devices 27 associated with the screen 21 are in front of the first orifice 13 - referred to the direction movement 38 - during the coating, so that after the coating process has been disturbed by the rollers 32 of said bracing and guiding devices 27, the material can still be distributed uniformly on the object 15. Since it is present on its surface in excess, an accumulation of coating material forms in front of the gap produced at the first orifice 13, which ensures that there is not too little coating material at any point on the object 15, whereas on the other hand a precisely defined coating thickness is ensured by the stripping effect of the first orifice 13.

At the lower end of the container 1, a further traction cable 39 may also be attached to the cable eye 35 shown in the drawing, if the inclination of the object to be coated with reference to the horizontal is so slight that the dead-weight of the apparatus including the coating material contained therein is not sufficient to make the apparatus slide downwards on the object 15 at an adequate speed.

When the apparatus has arrived at the bottom, the residual coating material present in the container 1 is discharged through the discharge pipe connection

26. The apparatus is then transferred to another support cable and hauled to the top once more.

If the object 15 to be coated has fluctuations in its diameter D along its length, then it is convenient to make the bracing and guiding devices fitted to the container half 3 which is underneath during the downward movement 38 radially elastically yielding by very small amounts. For this purpose, for example, the rollers 32 serving as bracing and guiding elements may be braced with reference to the respective bolts 28 through the intermediary of extremely hard springs. By this means it is ensured that, on the one hand, an adequate centric guidance of the object 15 relatively to the container 1 is always ensured, without it being possible for wedging of said object 15 with reference to the bracing and guiding devices 27 to occur.

CLAIMS

1. Apparatus for coating an elongate object with deformable coating material, including a container constructed to accommodate the coating material and having two mutually aligned orifices through which said elongate object is able to pass, of which a first orifice has a slight oversize compared to the object to be coated, and wherein at least one seal element adapted to be pressed against the object is associated with the second orifice.

2. Apparatus according to claim 1, wherein the container is adapted to be hinged open in an axial plane.

3. Apparatus according to claim 1 or 2, wherein the first orifice is constructed as an exchangeable screen.

4. Apparatus according to any one of claims 1 to 3, wherein the container is provided with a plurality of axially spaced bracing and guiding devices.

5. Apparatus according to claim 4, wherein the bracing and guiding device are adapted to be radially adjustable.

6. Apparatus according to claim 4 or 5, wherein the bracing and guiding devices are each provided with bracing and guiding elements at their radially inner end.

7. Apparatus according to claim 6, wherein the bracing and guiding elements are constituted by rollers.

8. Apparatus according to any one of claims 4 to 7, wherein at least two axially spaced sets of bracing and guiding devices are provided, each set comprising at least three bracing and guiding devices arranged in a common plane in each case.

9. Apparatus according to claim 8, wherein one set of bracing and guiding devices is arranged in the container in the proximity of the first orifice.

10. Apparatus according to claim 8 or 9, wherein a set of bracing and guiding devices is arranged outside the container in the proximity of the second orifice.

11. Apparatus according to any one of claims 4 to 10, wherein certain bracing and guiding devices are adapted to be radially elastically yielding.

12. Apparatus according to claim 1 or 2, wherein the container is of cylindrical construction and the orifices are aligned with the median axis thereof.

13. Apparatus according to claim 1, 2 or 12, wherein the second orifice is constructed in a cylindrical projecting spigot accommodating the at least one seal element.

14. Apparatus according to claim 1, wherein the container has a filling orifice in the proximity of the first orifice and a discharge orifice in the proximity of the second orifice.

15. Apparatus according to any one of claims 1 to 14, wherein the container is provided with at least one eye on its exterior.

16. Apparatus according to any one of claims 1 to 15, adapted for coating freely tensioned support cable with bitumen, plastics material or paint.

17. Apparatus for coating a support cable with a deformable coating material substantially as described herein with reference to and as illustrated in Figures 1 and 2 of th accompanying drawings.

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